We claim:

1. A broadband ellipsometer for evaluating the characteristics of a sample comprising:

a broadband light source generating a polychromatic probe beam, said probe beam having UV and visible wavelengths;

an optical system for focusing the probe beam onto a spot on the surface of the sample, said optical system including at least two lenses that are transparent to both UV and visible wavelengths and with the refractive powers of the lenses being selected to reduce chromatic aberration of the optical system;

an analyzer system for monitoring a portion of the probe beam light reflected from the sample and generating output signals responsive thereto; and

a processor for evaluating characteristics of the sample based on the generated output signals.

2. An ellipsometer as recited in claim 1 wherein the probe beam spot on the surface of the sample is less than 5 mm in diameter.

3. An ellipsometer as recited in claim 1 wherein the probe beam spot on the surface of the sample is less than 3mm in diameter.

4. An ellipsometer as recited in claim 1 wherein the focus shift over the range of wavelengths in the probe beam is less than five percent of the mean focal length of the optical system.

5. An ellipsometer as recited in claim 1 wherein the focus shift over the range of wavelengths in the probe beam is less than 2.5 percent of the mean focal length of the optical system.

6. An ellipsometer as recited in claim 1 wherein the analyzer system includes a detector and further including an imaging system for transmitting a portion of the probe beam light reflected from the sample to the detector.

7. An ellipsometer as recited in claim 6 wherein the portion of the probe beam transmitted by the imaging system corresponds to area on the sample less than 100 microns in diameter.

8. An ellipsometer as recited in claim 6 wherein the portion of the probe beam transmitted by the imaging system corresponds to area on the sample less than 60 microns in diameter.

9. An ellipsometer as recited in claim 6 wherein the imaging system includes an aperture between the sample and the detector.

10. An ellipsometer as recited in claim 1 wherein said probe beam has wavelength components spanning at least 500 nanometers.

11. An ellipsometer as recited in claim 1 wherein said probe beam has wavelength components spanning 200nm to 800nm.

12. An ellipsometer as recited in claim 1 wherein said optical system includes a first lens formed from calcium fluoride and a second lens formed from fused silica.

13. An ellipsometer as recited in claim 1 wherein said optical system includes three lenses.

14. An ellipsometer as recited in claim 13 wherein said optical system includes two lenses formed from calcium fluoride and one lens formed from fused silica.

15. An ellipsometer as recited in claim 1 wherein the lenses in the optical system are supported in a lens mount configured to minimize stress on the lenses.

16. An ellipsometer as recited in claim 1 further including a polarizer and wherein the lenses are aligned such that the transverse stresses in the lenses are aligned with the optical axis of the polarizer.

17. An ellipsometer as recited in claim 1 wherein the processor operate to determine the change in polarization state of the radiation at a plurality of wavelengths to derive ellipsometric information.

18. An ellipsometer as recited in claim 17 wherein the analyzer system generates output signals corresponding to a plurality of wavelengths simultaneously.

19. A broadband ellipsometer for evaluating the characteristics of a sample comprising:

a broadband light source generating a polychromatic probe beam, said probe beam having UV and visible wavelengths having a range of at least 500nm;

an optical system for focusing the probe beam onto a spot on the surface of the sample, said spot having a diameter less than 5mm, said optical system including at least two lenses that are transparent to both UV and visible wavelengths and with the refractive powers of the lenses being selected to reduce chromatic aberration of the optical system such that the focal shift over the range of wavelengths is less than five percent of the mean focal length of the optical system;

an analyzer system for monitoring a portion of the probe beam light reflected from the sample and generating output signals responsive thereto; and

a processor for evaluating characteristics of the sample based on the generated output signals.

20 An ellipsometer as recited in claim 19 wherein the probe beam spot on the surface of the sample is less than 3mm in diameter.

21. An ellipsometer as recited in claim 19 herein the focus shift over the range of wavelengths in the probe beam is less than 2.5 percent of the mean focal length of the optical system.

22. An ellipsometer as recited in claim 19 wherein the analyzer system includes a detector and further including an imaging system for transmitting a portion of the probe beam light reflected from the sample to the detector.

23. An ellipsometer as recited in claim 22 wherein the portion of the probe beam transmitted by the imaging system corresponds to area on the sample less than 100 microns in diameter.

24. An ellipsometer as recited in claim 22 wherein the portion of the probe beam transmitted by the imaging system corresponds to area on the sample less than 60 microns in diameter.

25. An ellipsometer as recited in claim 22 wherein the imaging system includes an aperture between the sample and the detector.

26. An ellipsometer as recited in claim 19 wherein said probe beam has wavelength components spanning 200nm to 800nm.

27. An ellipsometer as recited in claim 19 wherein said optical system includes three lenses.

28. An ellipsometer as recited in claim 27 wherein said optical system includes two lenses formed from calcium fluoride and one lens formed from fused silica.

29. An ellipsometer as recited in claim 19 further including a polarizer and wherein the lenses are aligned such that the transverse stresses in the lenses are aligned with the optical axis of the polarizer.

30. An ellipsometer as recited in claim 19 wherein the analyzer system and the processor operate to determine the change in polarization state of the radiation at a plurality of wavelengths to derive ellipsometric information.

31. An ellipsometer as recited in claim 30 wherein the analyzer system generates output signals corresponding to a plurality of wavelengths simultaneously.

32. An ellipsometer as recited in claim 19 wherein the lenses in the optical system are supported in a lens mount configured to minimize stress on the lenses.

33. A broadband ellipsometer for evaluating the characteristics of a sample comprising:

a broadband light source generating a polychromatic probe beam, said probe beam having UV and visible wavelengths having a range of at least 500nm and including 200nm;

an optical system for focusing the probe beam onto a spot on the surface of the sample, said spot having a diameter less than 3mm, said optical system including three lenses selected from the group consisting of calcium fluoride and fused silica and with the refractive powers of the lenses being selected to reduce chromatic aberration of the optical system such that the focal shift over the range of wavelengths is less than five percent of the mean focal length of the optical system;

an analyzer system including a detector for monitoring a portion of the probe beam light reflected from the sample and generating output signals responsive thereto, said output signals corresponding to a plurality of wavelengths simultaneously;

an imaging system including an aperture for transmitting a portion of the probe beam reflected from the sample to the detector and wherein the portion of the probe beam transmitted by the imaging system corresponds to area on the sample less than 100 microns in diameter; and

a processor for evaluating characteristics of the sample based on the generated output signals.

34. An ellipsometer as recited in claim 33 wherein the portion of the probe beam transmitted by the imaging system corresponds to area on the sample less than 60 microns in diameter.

35. An ellipsometer as recited in claim 33 wherein said probe beam has wavelength components spanning 200nm to 800nm.

36. An ellipsometer as recited in claim 33 further including a polarizer and wherein the lenses are aligned such that the transverse stresses in the lenses are aligned with the optical axis of the polarizer.

37. An ellipsometer as recited in claim 33 wherein the lenses in the optical system are supported in a lens mount configured to minimize stress on the lenses.